

REMARKS

The Applicants would like to thank the Examiner for the quick and courteous non-final Office Action. The Applicants are again very grateful to the Examiner for allowing claim 38, and indicating that claims 25, 29 and 32 would be allowable if rewritten to overcome the rejections under 35 U.S.C. §112, first paragraph, set forth in the Action, and to include all of the limitations of the base claim and any intervening claims. The Applicants are also particularly appreciative of the withdrawal of GB 2131067 and Stowe references.

The claims remaining in the application are 20-29, 32-38 and 40-42. Claims 20-29 and 31-37 and 40-42 are rejected. Claims 20, 22, 24, 27, 40 and 41 are amended herein. Claims 1-19, 30-31, 39 and 43 are cancelled. No new matter has been added.

Claim Objections

The Examiner advised the Applicant that should claim 22 be found allowable, claim 24 will be objected to under 37 CFR 1.75 as allegedly being a substantial duplicate thereof. When two claims in an application are duplicates or else are so close in content that they both cover the same thing, despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim, referring to MPEP § 706.03(k).

The Applicants would respectfully direct the Examiner's attention to the amendment to claim 20 herein from which claim 22 depends. Claim 20 has been amended to recite "the polymer latex comprises particles that average less than 1 micron in size". Support for this change (also made in claim 40) is supported by claim 37 as originally filed and thus does not constitute an improper insertion of new matter. Because of this change, the Applicants respectfully submit that claims 22 and 24 may no longer be understood to be substantial duplicates of one another, and the objection is rendered moot. Reconsideration is respectfully requested.

Claim Analysis

The Examiner notes that the method, as claimed, merely stipulates that a polymer latex of specific identity and water are brought into contact with the walls of a borehole. Accordingly, an anticipatory reference need not mention the effect of inhibiting wall invasion because this result is inherently realized when a like composition is circulated into the borehole.

The Applicants would respectfully note that the claimed method does not “merely stipulate[s] that a polymer latex of specific identity and water are brought into contact with the walls of a borehole”. Rather, all of the claims recite “circulating the water-based drilling fluid in contact with a borehole wall”. As will be further discussed below with respect to the art rejections, this is an important distinction over the cited art.

35 U.S.C. §112, First Paragraph, Rejection

The Examiner has rejected claims 22, 24-29, and 31-37 rejected under 35 U.S.C. 112, first paragraph, because the full scope of what is embraced by the term “precipitating agent” is unclear. The Examiner contends that the reason that this limitation is because (i) the term does not appear to enjoy widespread use in the prior art as it would pertain to aqueous drilling compositions – indeed, all of the disclosures surveyed by the Examiner in which this term was employed were all assigned to the same assignee as in the present case, and (ii) Applicant is not entirely committed to its exact role, see the description in paragraph 31 of the Specification and, hence, even the skilled artisan would have difficulty determining what compounds would serve in this capacity. Of course, this matter is rendered moot should Applicant simply add the limitations of claim 31 to claims 22, 24, and 27.

The Applicants appreciate the Examiner’s helpful suggestion to add the limitations of claim 31 to claims 22, 24, and 27 to overcome this rejection, and the Applicants would respectfully direct the Examiner’s attention to these independent claims where the term “precipitating agent” is now further recited

to incorporate the language of claim 31 as originally filed. Applicants thus respectfully submit that these changes thus do not improperly incorporate new matter, and also respectfully submit that these changes overcome the instant rejection. Dependent claim 31 is canceled as redundant herein. Reconsideration is respectfully requested.

Rejection under 35 U.S.C. §102(e) over Griffith, et al.

The Examiner rejected claims 20-24, 26-28, 31, 33, 36, and 42 under 35 U.S.C. §102(e) as allegedly being anticipated by U.S. Patent Application Publication No. 2002/0022579 to Griffith, et al. The Examiner finds that Griffith discloses an aqueous composition for sealing subterranean zones allegedly minimally comprising the materials outlined in the first several lines of paragraph 19, but also the surfactants mentioned in paragraph 46 and those that follow. Relevant to the present discussion, the Examiner contends that a favored embodiment of the rubber material on which the latex is based is styrene-butadiene (paragraph 24) and, more particularly, those having some sulfonate anion content (paragraph 26). The presence of sodium carbonate is asserted by the Examiner to satisfy Applicant's requirement for a salt, and the organophilic clay bentonite (paragraph 59), an aluminum silicate, the requirement for a precipitating agent insofar.

The Applicants respectfully traverse.

A patent claim is anticipated, and therefore invalid, only when a single prior art reference discloses each and every limitation of the claim. *Glaxo Inc. v. Novopharm Ltd.*, 52 F.3d 1043, 1047, 34 U.S.P.Q.2d 1565 (Fed. Cir.), cert. denied, 116 S.Ct. 516 (1995). As will be established below, the single Griffith, et al. reference does not disclose each and every limitation of the claims.

The Applicants respectfully note that Griffith, et al. addresses a much different technical problem than that addressed by the Applicants in the claimed invention, and thus the claimed invention herein is fundamentally different from what is disclosed in Griffith, et al. Griffith, et al. is concerned with relatively large volumes of lost circulation fluids that due to formation fluid

crossflows and/or underground blow-outs (please see paragraphs [0005] and [0018] and elsewhere). Griffith, et al. is further concerned with preventing lost circulation into relatively large fractures and vugs (please see paragraphs [0006], [0022], [0063] and elsewhere).

In contrast, the Applicants' method is directed toward inhibiting borehole wall invasion in relatively much smaller features, such as micro-fractures; please see paragraph [0050] on page 12, lines 24-27: "First, the ultra-fine, deformable latex particles (having a preferable diameter of about 0.2 microns) mechanically seal shale *micro-fractures* and physically prevent further intrusion of drilling fluids into sensitive shale zones." Please also see paragraph [0051] on page 13, lines 7-10: "Furthermore, due to the wide temperature range between its glass transition temperature (T_g) and melting point (T_m), the particles of EXP-155 *remain deformable and capable of plugging shale micro-fractures* at most application temperatures." and paragraph [0066] on page 19, lines 15-16: "Photomicrographs of the plug face showed latex accumulation along *microfractures* in the shale." (All emphasis added.)

Because Griffith, et al. is sealing relatively much larger features in a subterranean zone than the claimed invention herein, a much different method is disclosed therein. It is not important to Griffith, et al. that the drilling fluid remain stable until it reaches the large fractures and vugs, nor is it necessary that the latex particles remain small at that point – to the contrary, Griffith, et al. explicitly and repeatedly disclose that an agglomerated, rubbery sealing mass be formed in the wellbore. The Examiner's attention is respectfully directed to the following portions of Griffith, et al. (all emphases added):

Paragraph [0019]:

A first sealing composition of the present invention is basically comprised of water, an aqueous rubber latex, an organophilic clay, sodium carbonate, an epoxy resin and a hardening agent for the epoxy resin. The aqueous rubber latex present in the composition is caused to *destabilize* by oil or water containing electrolytes such as calcium chloride in the well bore *whereby the rubber is precipitated*. The organophilic clay simultaneously reacts with oil in the well bore *to form a high viscosity rubbery sealing mass*.

Paragraph [0020]:

The epoxy resin in the compositions is caused to harden by the hardening agent therein whereby the initially formed *high viscosity rubbery sealing mass* is converted into *a firm but resilient sealing mass* which has compressive strength and retains its shape in a sealed zone.

Paragraphs [0022-0023]:

The aqueous rubber latex is caused to *destabilize by oil or water containing electrolytes in the well bore whereby the rubber is precipitated and a viscous sealing mass is formed*. As described above, *the viscous sealing mass enters and seals vugs, fractures and other highly permeable zones and is retained in the zones long enough for the epoxy resin therein to harden*. The *resulting sealing mass retains its shape*, has compressive strength and effectively seals and strengthens the zones.

A third inventive sealing composition is basically comprised of a water swellable clay, a silane coupling agent, an epoxy resin and a hardening agent for the epoxy resin. When the water swellable clay contacts water, *it swells and forms the sealing composition into a viscous mass which enters and seals vugs, fractures and other highly permeable zones and is retained in the zones long enough for the epoxy resin therein to harden*. The *resulting sealing mass retains its shape*, has compressive strength and effectively seals and strengthens the zones.

Paragraph [0063]:

The methods of sealing a subterranean zone penetrated by a well bore using the sealing compositions described above basically comprise the steps of preparing a sealing composition, introducing the sealing composition into the subterranean zone by way of the well bore, and then *allowing the sealing composition to harden into a firm but resilient sealing mass in the zone*. Generally, the sealing composition is prepared in mixing apparatus on the surface and then pumped down the well bore into the zone to be sealed at a high pressure whereby *the viscous mass formed in the well bore is squeezed into fractures and vugs*.

Paragraph [0065]:

When the drilling fluid pumping pressure increases, the pumping of the sealing composition is continued until the sealing composition has been pumped into the open hole zone of the well bore. The pipe string is then moved upwardly away from the lost circulation zone. The pumping of the drilling fluid is continued until the fracture initiation pressure is reached. *Drilling fluid is then circulated through the pipe string to remove sealing composition from the inside surfaces thereof, and the sealing composition is allowed to harden*. *Thereafter, the well bore is drilled through the sealing composition and normal drilling is continued*.

This last excerpt is particularly instructive since it emphasizes that the hardened sealing composition is sufficiently large and massive that the well bore is *drilled through* the sealing composition mass to continue normal drilling.

It should also be noted that the compositions of Griffith, et al. are repeatedly and consistently noted as different from the claimed invention as well because Griffith, et al.'s compositions always require an epoxy resin and a hardening agent for said epoxy resin. Applicant's compositions do not require or desire such components.

In contrast, Applicants' polymer latex particles must remain in suspension until the micro-fractures are reached at which point they precipitate out to plug them. The Examiner's attention is respectfully directed to the above-noted excerpts from Applicant's specification about the micro-fractures. To emphasize this fact, the Applicants respectfully direct the Examiner's attention to independent claims 20 and 40 which have been amended herein to recite that the latex comprises particles that average less than 1 micron in size (this language is already present in dependent claim 37 as filed). This size parameter establishes the scale in which Applicants' invention operates and distinguishes the claimed invention from Griffith, et al. The Applicants respectfully submit that Griffith, et al. do not teach or suggest or hint at such small particles.

Additionally, the Examiner's attention is respectfully directed to the fact that all of the independent claims require "circulating the water-based drilling fluid in contact with a borehole wall"; Griffith, et al. does not teach or disclose that this circulating is necessary in their method – indeed circulating is not possible with the highly viscous, rubbery mass formed in their method, which may be hardened, and in fact, is hardened in many, if not most, embodiments therein. The only place where the Applicants could find that circulating is disclosed in the Griffith, et al. method was in the above-excerpted portion from paragraph [0065], and there the drilling fluid is noted as circulated only to remove the sealing composition from the inside surfaces to permit the sealing composition to harden into a sufficiently large mass that it must be

drilled through to permit normal drilling to continue. The Examiner's attention is respectfully directed to Applicants' specification at paragraphs [0064], page 18, lines 27-31 and all of paragraph [0066], page 19, lines 15-30 (all emphases added):

[0064] *Circulation of the fluid was found to be an important element of the latex plugging mechanism. This was explored in the tests with EXP-155. As the formulation was only 1.5% latex particles by volume (EXP-155 is 50% active), insufficient latex was available in the mud to produce plugging under static conditions. With circulation, however, the latex accumulated on the surface and formed a plugging film.*

[0066] *Photomicrographs of the plug face showed latex accumulation along microfractures in the shale. As the volume and velocity of filtration flow into these cracks is very small, filtration alone cannot account for the latex accumulation at the crack throat. Inside these cracks the clay surface area to filtrate volume ratio is very large resulting in heavy EXP-154 precipitation. The reason may relate to the co-precipitation behavior of EXP-154 and EXP-155 as discussed previous, without being limited to any particular explanation. The precipitation of aluminum complex at pH <19 apparently enhances latex accumulation at the crack throat. When sufficient latex is deposited to bridge the crack opening, the fracture is sealed and differential pressure is established across the latex. The differential pressure consolidates the latex deposit into a solid seal. Increasing the differential pressure apparently causes this seal to deform over time (about 30 hours in the case of the FIG. 6 results) and/or grows additional cracks in the shale and the shale begins to leak, although the inventors do not necessarily want to be limited by this explanation. However, additional circulation rapidly sealed the leaks and reestablished the seal. Circulating after the full differential pressure was reached formed a stable seal with only a small pressure rise.*

The Applicants thus respectfully submit that the single Griffith, et al. reference has not disclosed each and every limitation of the claims as amended. Griffith, et al. does not disclose "circulating the water-based drilling fluid in contact with a borehole wall", which is present in all independent claims. Furthermore, some of the independent claims also now recite that "the polymer latex comprises particles that average less than 1 micron in size" which are circulated in contact with the borehole wall. The single Griffith, et al. reference does not disclose this feature either since in Griffith, et al.'s method it is acceptable for the latex to massively precipitate out within the borehole to

form a highly viscous rubbery mass, which in most embodiments therein is further hardened.

For all of these reasons, the claims as amended are not anticipated by Griffith, et al. and the Applicants respectfully request that the rejection be withdrawn. Reconsideration is respectfully requested.

Rejection under 35 U.S.C. §103(a) over Griffith, et al.

The Examiner rejected claims 33-35 and 40-41 under 35 U.S.C. §103(a) as allegedly unpatentable over Griffith, et al. for reasons of obviousness.

The Examiner first finds that Griffith also mentions silicone rubber as a permutation of the rubber component from which a latex is formed. Although the Examiner admits that dimethylsiloxane rubber is not disclosed in Griffith, et al., the Examiner notes that this species of the silicone rubber genus is allegedly obvious as it is the most ubiquitous of the silicone polymers across a spectrum of applications for its wide commercial availability and economy. That is to say, where a specific property set is not desired, the Examiner asserts that dimethylsiloxane is almost without exception the polymer of choice among silicone rubbers.

Concerning claims 33-35 and 40, the Examiner finds that the reference reports the quantities of these materials in terms of their weight fraction as a percentage of the total. Because this expression of quantity is not easily correlated with those recited in the claims, the Examiner admits that he cannot ascertain whether the amounts mentioned are consistent with those claimed. Nevertheless, it is the Examiner's position that one having ordinary skill is allegedly capable of optimizing their quantities, taking into account their known roles, as a matter of routine experimentation.

The Examiner asserts that claim 41 is awkward in its construct and it is not clear exactly how it should be interpreted. It would seem that this only serves to further limit the nature/compositional makeup of the borehole walls. In this connection, at least shale is frequently encountered in many drilling environments and, therefore, the claim is obvious.

The Applicants respectfully traverse. To support an obviousness rejection, the Examiner has the initial burden of establishing a *prima facie* case of obviousness of the pending claims over the cited prior art, *In re Oeticker*, 977 F.2d 1443, 1445; 24 U.S.P.Q.2d 1443 (Fed. Cir. 1992). As will be demonstrated, a *prima facie* case of obviousness has not been established with respect to the rejected claims, as amended herein.

The Applicants respectfully direct the Examiner's attention to dependent claim 41 as amended herein to make the claim clear and not awkward. The Applicants respectfully submit that these changes do not change the scope of the claim, but rather make it clearer, and affirms the Examiner's understanding that the claim further recites the nature and compositional makeup of the borehole walls. The amendments to claim 41 thus are made herein to correct an inadvertent clerical issue and not for any reason substantially related to patentability. If the Examiner finds the current language awkward, the Applicants respectfully invite the Examiner to suggest acceptable language.

The Applicants respectfully submit that the claims as amended are not obvious from Griffith, et al. for the same distinctions over the single reference established above. First, Griffith, et al. does not suggest or hint at circulating the water-based drilling fluid in contact with a borehole wall as recited in all of the present independent claims. Griffith, et al.'s method only includes "introducing the sealing composition into the subterranean zone by way of the well bore, and then allowing the sealing composition to harden into a firm but resilient sealing mass in the zone" – excerpted from Griffith, et al.'s paragraph [0063] more fully excerpted *supra*. The drilling fluid being circulated is only mentioned in Griffith, et al. in paragraph [0065] as excerpted and discussed above where the drilling fluid is noted as "circulated through the pipe string to *remove* sealing composition from the inside surfaces thereof and the sealing composition is *allowed to harden*". This is *after* the sealing composition has been pumped into the open hole zone of the well bore. The forming of a "high viscosity rubbery sealing mass" and the hardening of that mass with an epoxy resin and a hardener – repeatedly required by Griffith, et al. – is not the recited method. Nor is there any suggestion or motivation given in Griffith, et

al. to modify their method to include “circulating the water-based drilling fluid in contact with a borehole wall”. The Applicants respectfully submit that such circulating would be inconsistent with the Griffith, et al. method that necessarily forms a high viscosity rubbery sealing mass.

“The mere fact that the prior art may be modified in the manner suggested by the Examiner does not make the modification obvious unless the prior art suggested the desirability of the modification.” *In re Fritch*, 972 F.2d 1260, 1266; 23 U.S.P.Q.2d 1780 (Fed. Cir. 1992). The Applicants respectfully submit that there is no such motivation in the record for one having ordinary skill in the art to modify the Griffith, et al. method in any way that would have it include the claimed circulating recited in the original claims.

Further, claim 40, and in turn, claim 41 dependent thereon, has been amended to recite that the copolymer latex “comprises particles that average less than 1 micron in size”. This change emphasizes that the claimed invention is a method for inhibiting borehole wall invasion where the latex is stable and that the very small latex particles fit and seal very small defects or micro-fractures and the like in the wellbore surface, *unlike* the relatively large features sealed by the masses of Griffith, et al. The soluble precipitating agents are very small anions that precipitate the latexes in the pore hole throats. The latex particles of the claimed invention are kept dispersed until they encounter the very small features, such as micro-fractures, as contrasted with the massive high viscosity rubbery sealing masses within the well bore disclosed and taught by Griffith, et al., which are sufficiently large that they must be “drilled through” to continue normal drilling. The Applicants further respectfully submit that the Griffith, et al. reference does not teach or suggest that the latex “comprises particles that average less than 1 micron in size” because they are only concerned with sealing relatively large features such as conventionally-sized fractures and vugs. There is no motivation on record for changing what is taught by Griffith, et al. to provide latexes where the particles average less than 1 micron in size.

The Applicants thus respectfully submit that one having ordinary skill in the art would not find the claimed invention obvious from Griffith, et al. because

it is addressed to solving a much different technical problem than the claimed invention. One having ordinary skill in the art attempting to inhibit borehole wall invasion in a subterranean formation on a small scale would discard the method of Griffith, et al. because it is only addressed to sealing relatively large features in subterranean zones forming high viscosity rubbery sealing masses in the well bore of a scale and type too large and unwieldy to solve the technical problem addressed.

For all of these reasons the Applicants respectfully submit that a *prima facie* case of obviousness has not been established against the claims as amended. Reconsideration and allowance of the claims are respectfully requested.

Double Patenting Rejection over Application No. 11/437351

The Examiner has provisionally rejected claim 1 on the ground of nonstatutory obviousness-type double patenting as allegedly being unpatentable over claims 1-7 of copending Application No. 11/437351.

The Examiner contends that the subject matter claimed in the instant application is fully disclosed in the referenced copending application and would be covered by any patent granted on that copending application since the referenced copending application and the instant application are claiming common subject matter.

The Examiner notes that the Applicants stated in their previous remarks that this rejection is overcome in view of their submission of a terminal disclaimer but the Examiner sees no evidence of one having been received.

The Applicants appreciate the Examiner's helpfully suggested that a timely filed terminal disclaimer would overcome the subject double patenting rejection. The Applicants regret the fact that the Terminal Disclaimer previously prepared was apparently inadvertently not uploaded when the 11 June 2007 Amendment was electronically filed. The Applicants regret any confusion that this inadvertent oversight may have caused. The Applicants are herewith timely filing a new Terminal Disclaimer to address this issue. The Terminal Disclaimer

fee has already been paid upon filing the 11 June 2007 Amendment in Private PAIR, and thus the fee does not need to be paid again, the Applicants respectfully submit. The Applicants thus respectfully submit that the subject rejection is overcome.

It is respectfully submitted that the arguments and amendments presented above and Terminal Disclaimer enclosed herewith overcome the rejections and place the claims in condition for allowance. Reconsideration and allowance of the claims are respectfully requested. The Examiner is respectfully reminded of his continuing duty to indicate allowable subject matter. The Examiner is also invited to call the Applicants' attorney at the number below for any reason, especially any reason that may help advance the prosecution.

Respectfully submitted,
WILLIAM S. HALLIDAY, et al.,

/David L. Mossman/

David L. Mossman
Registration No. 29,570
Attorney for Applicants
Telephone No. 512/219-4026
Facsimile No. 512/219-4036

Madan, Mossman & Sriram, P.C.
2603 Augusta, Suite 700
Houston, TX 77057-5640